

App. Serial No. 10/544,216
Docket No.: NI.030089US

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Remarks

In the immediately-preceding Amendment (filed December 7, 2006), claim 11 was cancelled. In the instant Office Action dated March 8, 2007, claims 1-10 stand rejected under 35 U.S.C. § 112(2), and claims 1-7 stand rejected under 35 U.S.C. § 103(a) over Sugiura *et al.* (U.S. 6,150,686). Although these rejections are traversed as explained below, Applicant has presented the above minor claim amendments in an effort to facilitate prosecution on the merits.

Regarding the Section 112(2) rejections of claims 1-10, Applicant submits that the claims satisfy the requirements of Section 112(2). Regarding the phrase "the thickness of the first part of the trench groove is larger than the thickness in a second part of the trench groove," Applicant submits that one of skill in the art would recognize that "the thickness" is referring to the thickness of the liner of a first insulating material found in claim 1 at line 7. Therefore, it would be clear to one of skill in the art that the thickness of the insulating material in one part of the trench groove is being compared to the thickness of the insulating material in another part of the trench groove. Moreover, Applicant notes that this is consistent with the Examiner's interpretation in asserting correspondence between the claims and the Sugiura reference. *See*, the instant Office Action, page 3. Accordingly, the Section 112(2) rejection of claims 1-10 based upon the above mentioned claim language is improper and Applicant requests that it be withdrawn.

Notwithstanding, in an effort to facilitate prosecution, Applicant has amended claims 1-2 and 6-7 to recite that which would have been clear to one of skill in the art (*i.e.*, that the thickness of the insulating material in one part of the trench groove is being compared to the thickness of the insulating material in another part of the trench groove). Applicant submits that these amendments should be entered in that they comply with 37 C.F.R. § 1.116 in that the amendments place the claims in better form for consideration on appeal. As noted above, these amendments are consistent with the Examiner's interpretation of the claims.

The Section 112(2) rejection of claim 6 is based upon the claim phrase "filling the trench groove at least with a first insulating material and with a first filler material ... wherein the first filler material at least partially fills a remaining part of the trench groove". Contrary to the asserted interpretation of this phrase, claim 6 does not require that the trench groove be completely filled with the two materials (the Examiner appears to be reading the

App. Serial No. 10/544,216
Docket No.: NL030089US

claim as requiring that the two materials fill the entire trench groove. The claim phrase is directed to filling the trench groove with at least two materials, with one material filling a specific part of the groove and the other material at least partially filling the remaining part of the groove. The remaining part of the trench groove could be completely filled with the first filler material, but this is not required by the claim language. The claim language "filling the trench groove at least with a first insulating material and with a first filler material" does not exclude the groove from being partly filled with a third material, nor does it require the groove to be completely filled with the first insulating and the first filler materials. In view of the above, the Section 112(2) rejection of claims 6-10 is improper and Applicant request that it be withdrawn.

As claims 8-10 are not rejected in view of any prior art, Applicant submits that claims 7-10 are allowable.

Applicant respectfully traverses the Section 103(a) rejections of claims 1-7 because the reference cited by the Examiner fails to correspond to all of the claimed limitations. Regarding claims 1 and 6, the cited portions of the Sugiura reference do not correspond to all of the claimed limitations including those directed to a trench isolation structure. The Examiner asserts that "(i)t would have been obvious that the trench (*see* trench 12 in Figure 1 of Sugiura) provides an isolation function, because current will not flow through the insulating trench sidewall material." However, the cited portions of the Sugiura reference teach that the source region 19 of a selection transistor is electrically connected to the conductive layer 16 through the side wall portion of the trench 12. *See, e.g.*, Figures 1-2 and Col. 6:14-20. The Sugiura reference also teaches that the conductive layer 16 is integrated with the electrode 15 and they are illustrated in Figure 2 as one member. *See, e.g.*, Col. 5:65-67. The Sugiura reference further teaches that the electrode 15 formed in the trench 12 is capacitively coupled to the lower region 11B of the semiconductor substrate 11. Figure 1 and Col. 3:28-35. Thus, Sugiura reference teaches that the trench 12 is electrically connected to the source region 19 and that is capacitively coupled to the lower region 11B. Therefore, the trench 12 does not provide an isolation function as asserted by the Examiner and, as such, it does correspond to the trench isolation structure of the claimed invention. Accordingly, the Section 103(a) rejection of claims 1 and 6, as well as the rejection of

App. Serial No. 10/544,216
Docket No.: NL030089US

claims 2-5 and 7 that depend from claims 1 or 6, is improper and Applicant requests that it be withdrawn.

Applicant further traverses the Section 103(a) rejection of claims 2 and 7 because the cited portions of the Sugiura reference do not correspond to all of the claimed limitations including those directed to the thickness of the first insulating material in the first part of the trench groove being larger than the thickness of the first insulating material in the third part of the trench groove. Applicant notes that antecedent basis for "said thickness" in claim 2 is found in claim 1 at line 7. The Examiner cites to silicon oxide film 14 of Sugiura as corresponding to the claimed thickness in the first part (*see, e.g., Figure 1*) and then asserts that "the insulator at 14 has no insulator at all above it, so its thickness is greater than "the thickness" of the insulator above, because anything is larger than zero." Thus, according to the Examiner the cited portions of the Sugiura reference do not teach that there is an insulator above the silicon oxide film 14. As such, there is no correspondence between the claimed limitations which require that the first insulating material have a thickness in the third part of the trench groove which is above the first part. Moreover, the Examiner's assertion that zero corresponds to a thickness is improper. A thickness of zero is no thickness at all, in order for something to have a thickness it has to be greater than zero. Therefore, the Section 103(a) rejection of claims 2 and 7 is improper and Applicant requests that it be withdrawn.

Applicant further traverses the Section 103(a) rejection of claim 3 because the cited portions of the Sugiura reference do not correspond to all of the claimed limitations including those directed to the first part of the trench groove being completely filled with the first insulating material. The Examiner cites to the portion of trench 12 of Sugiura that is between the buried layer 18 as corresponding to the claimed first part. *See, e.g., Figures 1 and 2.* However, the cited portions of the Sugiura reference teach that this portion of trench 12 is filled with a silicon oxide film 14 and with an electrode 15. Thus, the cited portion of the trench 12 is not completely filled with insulating material as in the claimed invention. Accordingly, the Section 103(a) rejection of claim 3 is improper and Applicant requests that it be withdrawn.

App. Serial No. 10/544,216
Docket No.: NL030089US

In view of the remarks above, Applicant believes that each of the rejections has been overcome and the application is in condition for allowance. Should there be any remaining issues that could be readily addressed over the telephone, the Examiner is asked to contact the agent overseeing the application file, Peter Zawilski, of NXP Corporation at (408) 474-9063 (or the undersigned).

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